

established between science and industry to the enormous advantage of both.

A large part of the duties of the director consists in attending congresses and in every way keeping abreast of the most recent discovery, with the object, of course, of gaining information which may be turned to practical utility.

While in Germany there is thus a fairly lucrative career for a young chemist, in England, although there will soon be many well-trained men, the openings are few. Such as there are are filled by men whose minds are occupied with too many things. The chemist is often analyst, works-manager, and investigator all at once; and it is no wonder that he is not a success, and that manufacturers doubt his utility in their business. Moreover, it is very desirable that a closer touch between universities or university colleges and manufactures should be brought about, if possible, for it cannot fail to be to the advantage of both industry and science—to industry, in order that technical problems may receive scientific treatment, and to science, because some of the most interesting problems are often suggested by the technologist.

Now, we are producing trained engineers and chemists quite as inventive and capable as our German competitors. But the prospect of a reasonably remunerative career is generally wanting. It would obviously be to the advantage of manufacturers to engage such young men, not expecting them, of course, to be able at first to introduce improvements which will effect a saving; but by looking out for young men with some originality, by giving them time to learn their business, and by offering an ultimate inducement in the shape of a share of profits, our manufacturers will undoubtedly reap the benefits which have given our German competitors their lead in industries in which chemistry plays a part.

#### NOTES.

At the Institution of Civil Engineers on Tuesday, November 3, an inaugural address will be given by the president, Sir William H. White, K.C.B., F.R.S.; the medals and other awards made by the council will be presented, and there will be a reception in the library of the Institution.

MR. MARCONI arrived at Liverpool on board the *Lucania* last Saturday. The results of his experiments are said to have been very satisfactory; whilst in mid-Atlantic he was able to receive simultaneously communications from England and America. It is also stated that he hopes within six or eight months to re-establish commercial communication across the Atlantic.

THE trials of the high-speed electric cars on the Berlin-Zossen military line have been continued with much success. A maximum speed of 125½ miles an hour was attained by the Siemens-Halske car last week; the average speed over the whole run of 14 miles, including the time of starting and stopping, was 109½ miles an hour. The trials of the rival car, which the Allgemeine Elektrizitäts Gesellschaft is building, have yet to be made. The track has been relaid since the experimental runs last year, and it is stated that it is now thoroughly satisfactory. The result of the trials is looked upon as demonstrating the practicability of high speed working over long distances, and it is estimated that it will be possible to reduce the time taken over the journey from Berlin to Cologne from nine to three and a quarter hours.

THE secretary of the Institution of Electrical Engineers informs us that the bronze shield subscribed for by the students of the Institution at the beginning of the present year has now been placed upon the tomb of Volta at Camnago, near Como. The ceremony of fixing it in place was performed on Sunday, October 4, with many expressions of international good feeling, in the presence of

Prof. Count Alessandro Volta, Cav. Franchi, the Sindaco of Camnago, with several members of the Volta family and a number of other guests. The shield is mounted on a slab of green marble supported on granite in front of the tomb. The electrotype reproduction, which was officially deposited on the tomb on the occasion of the visit of the Institution in April last, has been transferred to the Civic Museum in Como, where it is placed in the collection of Volta relics.

DR. W. A. NOYES, of the Rose Polytechnic Institute, has accepted the position of chemist in the United States National Bureau of Standards.

DR. B. A. WHITELEGGE, C.B., His Majesty's Chief Inspector of Factories, has been appointed president of the Epidemiological Society in succession to the late Dr. W. H. Corfield.

AN International Fine Art and Horticultural Exhibition is to be opened at Düsseldorf on May 1, 1904. A hope is expressed that England will contribute largely to this exhibition.

REUTER reports that Prof. Langley's aerodrome, for which the U.S. Government granted a subvention of 15,000*l.*, was launched on October 7 from the railway over the flat boat on Whitewater, a section of the Potomac River. The machine balanced perfectly when it started, but soon struck the water, with the result that it was wrecked. Previous experiments have been made with models only, and this trial was the first made with the full-sized airship, which is constructed to carry a passenger.

THE Home Counties Nature-Study Exhibition, which is being organised by the Middlesex Field Club and Nature-Study Society, and delegates from the Selborne Society, will be held from October 30 to November 3 at the offices of the Civil Service Commission, Burlington Gardens, London, W. Intending exhibitors should communicate with the honorary secretary, Mr. Wilfred Mark Webb, 20 Hanover Square, London, W., who will be pleased to supply full information.

WE learn from *Science* that the American Grape Acid Association, 318 Front Street, San Francisco, Cal., offers a premium of 500*l.* for any person who devises a process or formula for the utilisation of California grapes containing more than 20 per cent. of saccharin, worth 2*l.* a ton, to produce tartaric acid at a price that would permit of exportation without loss. The decision in awarding the amount is to rest with a jury of five, of which Prof. E. W. Hilgard, of the University of California, is one. The offer closes on December 1, 1904.

THE first meeting of the Manchester Astronomical Society—a new local association of persons interested in astronomy and observational work—was held on Wednesday, October 7, when an address on solar parallax was given by the president, Prof. T. Gore. The Society has its centre and home in the Municipal School of Technology, Manchester, and members have the privilege of using the telescopes and other instruments in the new Godlee Observatory.

THE death is announced of Mr. Henry M. Brunel, the second son of I. K. Brunel, the engineer. Mr. Henry Brunel entered into partnership with Sir John Wolfe Barry in the 'seventies of last century, and took active interest in the scientific researches bearing upon naval architecture carried on by the late Mr. William Froude, F.R.S. He was largely associated in the work of Barry Dock, the railway bridge over the Thames at Blackfriars, the bridge erected at Connel Ferry, and with the Tower Bridge. He was a member of the Institution of Civil Engineers and of the Institute of Naval Architects.

AN excessive downpour of rain is reported from New York on October 8-9, amounting to more than ten inches in thirty hours. This is said to be the greatest fall at that place since the Weather Bureau was established there, in 1867, and has caused great damage to property. The streets resembled rivers, and in some parts the water rose waist-deep. The train service between New York and Philadelphia was temporarily suspended; the Delaware River rose to the highest level ever known, and several bridges have collapsed. Since 1889, the U.S. Weather Bureau has published tables of excessive rainfall from self-recording gauges. We have referred to these, and find that, although such excessive falls do occur from time to time, they are of rare occurrence. During the years 1889-1896, for instance, the highest record was 9.86 inches in twenty-four hours, at Jacksonville (Florida), in September, 1894.

WE have received the report of the director of the Philippine Weather Bureau, 1902, part iii., containing very clearly printed hourly observations of atmospheric phenomena at the Manila Central Observatory, with hourly and monthly means. The extreme daily values of each of the elements are brought together in a separate table. This is one of the few observatories at which observations of ozone are taken. Parts iv. and v. still remain to be published, and will contain magnetic observations and the results for the secondary stations of the Archipelago. The complete series will form a valuable contribution to the climatology of the Far East.

WE have received the report of the Hong Kong Observatory for the year 1902, containing hourly readings of the different meteorological elements, together with some magnetic and astronomical observations. The weather forecasts issued during the year have been very satisfactory; 56 per cent. were completely successful, and 35 per cent. partially successful. According to the practice usually followed in dealing with the results, 91 per cent. of the forecasts may be therefore considered as more or less successful. The collection of observations at sea for the construction of trustworthy monthly pilot charts has been vigorously continued; the number of days' observations obtained during the year was 9073, while the total number of sets now collected amounts to nearly 261,000. The area dealt with lies between 9° S. and 45° N. latitude, and between the longitude of Singapore and 180° east.

M. K. OLSZEWSKI describes in the Cracow *Bulletin* a new apparatus for the liquefaction of hydrogen, differing from his previous models in having both regenerators and the intermediate cooler for receiving liquid air all placed in a common vacuum chamber. The apparatus is said to work faultlessly.

THE formation of "Liesegang's rings" by the precipitation of silver chromate in gelatin forms the subject of a paper by Messrs. H. W. Morse and G. W. Pierce in the *Proceedings of the American Academy*. The formation of the precipitate in rings is clearly a case of supersaturation, and the authors now obtain a definite constant value for the product of the concentrations of the silver and chromate ions in order that supersaturation may take place.

SEVERAL papers on the so-called N rays discovered by M. Blondlot are printed in the *Journal de Physique* for August. M. Blondlot shows that these rays are of common occurrence, being emitted by an Auer lamp and an incandescent silver lamina, and being present in sunlight. M. G. Sagnac describes determinations of the wave-length of these rays by means of their diffraction. It appears

that the rays in question are about two octaves below the Rubens infra-red rays, and intermediate between these and the Hertzian radiations of Lampa. Their wave-length is about 0.2 of a millimetre.

SEVERAL writers have raised difficulties in connection with Boltzmann's minimum theorem in the kinetic theory of gases on the ground of the reversibility of the motions of the individual gas-molecules. Some remarks on this point are contributed by Dr. A. Pannekoek to the *Proceedings of the Amsterdam Academy*. For the case considered the author finds that when in a purely mechanical reversible process, which is repeated a number of times, a small variation in the initial data causes a large variation in the final state, the total process assumes the properties of an irreversible process.

SOME observations made in the Arosa Valley on atmospheric electricity at high altitudes are described by Mr. W. Saake in the *Physikalische Zeitschrift*, 23. The most noteworthy results were the observation of a negative fall of potential on certain clear and cloudless winter days, the facts that the coefficient of electric dispersion of electricity was increased by the Föhn and that under normal conditions the coefficient of negative dispersion attained a maximum at about 8 a.m. and between 4 and 5 p.m., and the large capacity of the atmosphere for radio-active emanation, which was about three times as great as in Wolfenbüttel.

THE Hopkins-Stanford Expedition to the Galapagos Islands in 1898-99 turns out to have been remarkably successful in the matter of new species of marine fishes from that area. According to a paper by Messrs. Heller and Snodgrass, published in the *Proceedings of the Washington Academy* (vol. v. pp. 189-229), the number of novelties is twenty-three, of which no less than five are regarded as indicating new generic types. Most of the species are figured in the plates accompanying the memoir, and we may particularly direct attention to the excellent effect produced by the sepia-like printing of plates 8 and 9.

IN the October issue of *Bird Notes and News*, attention is directed to the power now possessed by county councils of extending protection during winter to birds of any kind, and the value of this to many resident species. The introduction last July into Parliament of a Bill to abolish the pole-trap is likewise the subject of a commendatory note. A letter from Colonel Irby, which appeared in the *Saturday Review* of July 18, on the subject of taking rare birds and their eggs for so-called scientific purposes is reproduced. In this communication the writer directs attention to the shooting of a pair of pratincoles last spring near Romney, and likewise to the taking of a nest of the blue-headed wagtail near Winchelsea.

THE *Century Magazine* for October contains an account by Mr. L. O. Howard of the recent investigations which have served to connect the propagation of yellow fever with a certain species of mosquito (*Culex aeniatus*). A map (after Mr. Theobald) is given of the distribution of this mosquito, which coincides exactly with that of yellow fever. To protect oneself from the malaria mosquito, it is only necessary to use gauze curtains at night; the yellow fever mosquito, on the other hand, is a diurnal species, so that escape from its stab is a matter of much greater difficulty. In a well-illustrated article in the same journal entitled "The Wild Bird by a New Approach," Mr. F. H. Herrick comments on the revival of interest in nature generally, and natural history in particular, which has taken place of late years in the United States. Birds have been specially

favoured in this respect, and the author directs attention to the amount of information with regard to their habits obtainable by the new method of photography at short distances, to which allusion has been previously made in these columns.

We have received a copy of the eighth report on the periodic variations of glaciers, by Dr. S. Finsterwalder and E. Muret (*Arch. des Sc. phys. et nat., Genève*).

We have received from the Queensland Department of Mines, Geological Survey Reports, Nos. 181 and 183, by Mr. Walter E. Cameron. The author deals with recent mining developments on the Ravenswood Gold Field, where rather more than 2 oz. 7 dwt. of gold per ton has been raised during the past three years. He also gives further particulars relating to coal, and gold, silver, and copper ores in the Mackay and Bowen districts.

PROF. W. M. DAVIS has sent us copies of two recent essays on earth sculpture (*Bull. Mus. Comp. Zool., Harvard Coll., vol. xlii.*). One deals with the plateau province of Utah and Arizona. Evidence is given to show that the greater part of the faulting had been accomplished before the uplift of the region by which the erosion of the Colorado canyon was initiated, but some modern faulting of large amount has taken place. The other essay is on the mountain ranges of the Great Basin, in which the author deals with the effects of erosion on faulted mountain-blocks.

THE surface geology of Cheshire in its relation to agriculture is dealt with by Mr. William Edwards (*Proc. Liverpool Geol. Soc., vol. ix. part iii.*). He refers to the Drift soils, but more especially to those derived from Triassic rocks. The Keuper Marls yield some of the best soils, owing to their mineral ingredients, to their physical properties, and in part to their colour. The author observes that most of our best soils have a deep red colour, and probably the value of this colour depends upon its power to absorb the heat rays of the sun.

THE general report of the work carried on by the Geological Survey of India for the year 1902-1903 has been drawn up by the new director, Mr. T. H. Holland. Economic inquiries have been made with regard to coal, chromite, fire-clay, gold, iron, manganese, lead, petroleum, &c. Field-work was carried out in seven districts. In the report on the Punjab area, reference is made to evidence brought forward by Dr. Noetling, that in the Salt Range the sedimentary series from Cambrian to Tertiary has been thrust bodily in a southerly direction over the salt-marl, and that the marl is not pre-Cambrian, but simply belongs to the Tertiary salt-bearing formation, like that represented at Kohat.

We have received from Messrs. Darbishire and Stanford, of the Oxford Geographical Institute, Oxford, specimens of a new series of outline maps which they are issuing under the title of the "Autograph Handmaps," at the price of one penny each. The feature of the series is that, besides showing the coast lines and the principal rivers, the chief hill features of the country are indicated by a very expressive scheme of shading, which renders the pictorial value of the maps, and therefore their value in elementary teaching, decidedly greater than is the case where contour lines are employed. The execution is somewhat unequal, but generally good; the maps of the British Isles, Scotland, and Ireland are the best. We note that in most cases the name of the projection on which the map is drawn, the

natural scale, and scales of miles and kilometres, are given. The maps are printed in a dull brown colour, so that additional matter introduced by teacher or pupil stands clearly out. The maps are a valuable addition to the equipment available for teaching geography, and as such should be heartily welcomed.

IN the Cracow *Bulletin*, Mr. Ed. Janczewski proposes a new classification of the species belonging to the genus *Ribes*. The author distinguishes six subgenera, four of which (*Ribesia*, *Berisia*, *Grossularioides*, and *Grossularia*) are characterised by scarious scales, while in the other two (*Calobotrya* and *Coreosma*) the scales are herbaceous.

THE early cell divisions in the germinating spore of the liverwort *Pellia* form the subject of a paper by Mr. C. J. Chamberlain in the *Botanical Gazette*. As Prof. Farmer originally showed, interest attaches to the nuclear divisions at this stage owing to the appearance of a centrosphere and radiations. Mr. Chamberlain holds the opinion that the radiations represent lines of streaming material.

It is known that the red and blue colours of many flowers and fruits are due to the pigment anthocyanin, which occurs in the cell sap. Mr. T. Ischimura has examined its formation in hydrangea flowers, and describes the results in the *Journal of the College of Science, Tokio*. In conformity with the reactions obtained the author concludes that anthocyanin is a tannin, or a tannin derivative, and shows that besides tannin, light, and generally sunlight, is necessary for its formation.

IN the report for the year 1902-3, the director of the Botanical Survey of India announces the retirement of Mr. J. F. Duthie, who held the post of director of the Botanical Department of Northern India. The investigations of the various kinds of Indian yams are being continued, and cultivations of fibre plants are being undertaken in order to determine the sources of the fibres classed as Indian hemp. Mr. C. A. Barber refers to a disease known as "spike" which is destroying the sandal wood plantations of Mysore and Coorg, and also reports the appearance of a species of fungus on cholam leaves, similar to one which is very destructive to the sugar cane.

A USEFUL little book on "Hardy Perennials," by Mr. D. S. Fish, has been published in the Rural Handbook Series by Messrs. Dawbarn and Ward, Ltd. Amateur gardeners will find in the book practical hints on the selection, arrangement, and cultivation of many hardy garden flowers.

MESSRS. ROSS, LTD., have issued recently an abridged catalogue for 1903, and a new edition of their "C" catalogue. Both lists are beautifully illustrated with reproductions of photographs taken with Ross, Ross-Zeiss, and Ross-Goerz lenses, and contain full information of photographic and other optical apparatus.

We have received a second edition of the discourses by Dr. Stephan Waetzel bearing the title "Die Jugendsprache Goethe's" and "Goethe und die Romantik," the first edition of which was printed in 1888. An addition has now been made in the form of a third discourse dealing with the ballads of Goethe and their origin.

ALL photographers will find something of value and interest in the first number of the *Practical Photographer*—that for October. Not only is photography regarded from



its scientific side by chemists and others, but the artistic aspects of the photographer's work are dealt with in a helpful manner by experienced writers. The magazine is admirably illustrated by a profusion of well executed plates, and is published by Messrs. Hodder and Stoughton.

MESSRS. F. E. BECKER AND CO., of Hatton Wall, London, are manufacturing cheap electric switchboards for use in physical laboratories supplied with continuous current, designed by Mr. William Bennett, of the Gravesend Technical School. It is claimed that by this method it is impossible for students to short circuit the mains, as only one wire is carried round the room. A switch block is provided in each working place, and all students have the same current, but any student can switch the current on or off without interrupting others. The boards are supplied with resistances, instruments for measuring current, and other necessary adjuncts.

WE have received the thirty-sixth volume, that for 1902, of the *Journal and Proceedings* of the Royal Society of New South Wales. The original papers contained in the first part of the volume are seventeen in number, and many of them are illustrated by plates, of which there are no less than twenty-one. The volume concludes with the annual address delivered to the engineering section of the Society, and two papers also read to the same section. As abstracts of the papers read before the Society are periodically published in NATURE, it only remains to be said that the scientific work of the Society, as represented by the contents of the volume before us, does honour to the colony of New South Wales.

THE additions to the Zoological Society's Gardens during the past week include two Black Lemurs (*Lemur macaco*) from Madagascar, presented by Mr. Walter Barnes a South African Hornbill (*Bucorvus cafer*) from South Africa, presented by Mr. W. Champion; two Larger Patagonian Conures (*Cyanolyseus byroni*) from Chili, presented by Mr. E. C. Davids; two Grey-winged Ouzels (*Merula bouboul*) from India, an Adelaide Parrakeet (*Platycercus adelaidae*) from Australia, three Derbian Sternotheres (*Sternotheres derbianus*) from West Africa, two Adorned Terrapins (*Chrysemys ornata*) from Central America, four Brazilian Tortoises (*Testudo tabulata*), four Orbicular Horned Lizards (*Phrynosoma orbiculare*) from Brazil, deposited.

### OUR ASTRONOMICAL COLUMN.

REPORTED DISCOVERY OF A NOVA.—A telegram received from the Kiel Centralstelle on October 5 announced that Prof. Wolf had discovered what was probably a new star on the evening of September 21. He found the position of the object, reduced to the equinox of 1903, to be R.A. = 20h. 14m. 6.8s., Dec. = +37° 9' 49", and reported that its spectrum was of the nebular type.

A further communication received from Kiel announces, however, that a telegram received from Prof. Pickering states that the object is not a Nova, but a variable having a spectrum of the fourth type, whilst another telegram from Prof. Hale announces that Barnard has identified the supposed Nova with the star B.D. + 37° 38' 76" (R.A. = 20h. 14m. 6.8s., Dec. = +37° 9' 47"), and found the colour to be "very red." Dr. Parkhurst determined the magnitude of the variable on October 5, and found it to be 10.6.

1903-4 EPHEMERIS FOR WINNECKE'S PERIODICAL COMET. The elements and ephemeris of Winnecke's comet for its appearance during 1903-4 have been calculated by Herr C. Hillebrand, of Graz, and are published in No. 3907 of the *Astronomische Nachrichten*. The elements and part of the ephemeris are given below:—

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Epoch = 1904 Jan. 24.0 (M.T. Berlin).

$$\begin{aligned} M &= 0 \quad 28 \quad 1'61 \\ \pi &= 274 \quad 19 \quad 45'40 \\ \Omega &= 104 \quad 12 \quad 36'44 \\ i &= 16 \quad 59 \quad 54'78 \end{aligned} \quad 1903.0 \quad \begin{aligned} \phi &= 45^\circ 38' 0''12 \\ \mu &= 608'' 801706 \\ \text{Perihelion} &= 1904 \text{ Jan } 21'24 \end{aligned}$$

Ephemeris Oh. (M.T. Berlin).

1903	a app.		s.		δ app.		log r	log Δ
	h.	m.	s.		h.	m.		
Nov. 1	13	35	54.28	...	0	11	47.0	...
" 3	13	41	49.41	...	0	35	3.6	...
" 5	13	47	50.73	...	0	2	5.9	...
" 7	13	53	58.38	...	0	39	40.7	...
" 9	14	0	12.47	...	1	17	39.6	...
" 11	14	6	33.07	...	1	56	2.0	...
" 13	14	13	0.47	...	2	34	46.1	...
" 15	14	19	34.92	...	3	13	50.8	...
" 17	14	26	16.54	...	3	53	13.8	...
" 19	14	33	5.45	...	4	32	53.3	...
" 21	14	40	1.91	...	5	12	46.9	...
" 23	14	47	6.18	...	5	52	52.6	...
" 25	14	54	18.36	...	6	33	7.1	...
" 27	15	1	38.61	...	7	13	27.7	...
" 29	15	9	7.05	...	7	53	50.7	...

DIAMETER OF NEPTUNE.—Herr C. W. Wirtz, Strassburg, publishes the results of a series of measurements of the diameter of Neptune, made by him during the period December, 1902–March, 1903, in No. 3907 of the *Astronomische Nachrichten*. As the mean result of forty-nine measurements, made on twenty-six evenings, he obtained 2".303 with a possible error of  $\pm 0".044$  for the value of the diameter.

Taking the value of the solar parallax as 8".80, and Bessel's dimensions for the earth, this gives the actual diameter of Neptune as 50,251 km. and the mean density of the planet as 1.54, the density of the earth being taken as 5.53.

THE OPPOSITION OF EROS IN 1905.—In No. 73 of the Harvard College Observatory *Circulars* Prof. Pickering publishes an ephemeris for Eros during the opposition of 1905.

This ephemeris gives the Julian Day, the date, the R.A. (1900) and Dec. (1900), the logarithms of the distances from the sun and earth respectively, and the computed magnitude for every tenth day from November 21, 1903, to December 20, 1905; it has been obtained by interpolation from an ephemeris, for intervals of forty days, computed by Mr. F. E. Seagrave from the elements published in the *Berliner Jahrbuch* for 1905.

As seen from the ephemeris, the opposition of Eros during 1905 will be one of the most unfavourable oppositions that can possibly occur, for the computed magnitudes never exceed the twelfth. Prof. Pickering recommends that observations of the light variations, both photographic and visual, should be made during the opposition, although Prof. Bailey, working with the 13-inch Boyden telescope at Arequipa during the present year, has obtained an excellent set of light-curves of this planet. In general the position of the planet in the sky, during the 1905 opposition, will be nearly opposite to that which it occupied during the spring of 1901, when its variability was discovered.

THE ROYAL UNIVERSITY OBSERVATORY, VIENNA.—The sixteenth annual volume of the Vienna Observatory *Publications* contains the details of the "zone observations" for the zone  $-6^\circ$  to  $-10^\circ$ , made in accordance with the programme of the Astronomische Gesellschaft for its star catalogue, and collected by Dr. Johann Palisa. The observations were made with the 11½-inch Clark refractor, and the tables give the position for 1875.0, together with the usual reductions.

The same instrument was also used by Herr J. Rheden for observing the opposition of Mars during the period December 21, 1898–March 16, 1899, and the results of these observations, including eight excellent coloured reproductions of Herr Rheden's drawings, form the second part of the publication.

The third and last section is devoted to the meteorological observations made during the years 1897, 1898, 1899 and 1900.